WHAT IS CLAIMED IS:

1. A system, comprising:

a detection module having a radiation source to produce a probe beam, a beam-guiding element to direct said probe beam to a reflective surface of a substrate with line features to produce a reflected probe beam, a radiation-processing module to manipulate said reflected probe beam to produce a radiation output, and a radiation detection unit to convert said radiation output to produce a curvature signal having curvature information of an area of the reflective surface based on said reflected probe beam; and

a processing module coupled to receive and process said curvature signal and operable to compute stresses of each line feature on said substrate from an analytical function of curvatures in two different directions of the substrate corresponding to the location of the line feature.

2. The system as in claim 1, wherein said processing module is operable to:

extract information of a surface spatial gradient of an illuminated area on the substrate;

process the surface spatial gradient information to simultaneously measure a first curvature of the substrate along a longitudinal direction of the line feature and a

second curvature of the substrate at the same location along a

transverse direction perpendicular to the longitudinal

direction; and

compute the stresses on the line feature based on

measured first and second curvatures.

3. The system as in claim 1, wherein said processing

module is operable to:

compare the computed stresses on the line feature to an

acceptable maximum stress; and

generate an indicator when a computed stress on the line

feature exceeds the acceptable maximum stress.

4. The system as in claim 1, wherein said radiation

source includes a laser.

5. The system as in claim 1, wherein said radiation-

processing module includes two optical gratings.

6. A system, comprising:

a first mechanism to extract information of a surface

spatial gradient of an illuminated area on a substrate from an

radiation image pattern obtained from a reflection of

radiation from the illuminated area;

a second mechanism to process the surface spatial gradient information to simultaneously measure a first curvature of the substrate along a longitudinal direction of the line feature and a second curvature of the substrate at the same location along a transverse direction perpendicular to the longitudinal direction; and

a third mechanism to compute the stresses on the line feature based on measured first and second curvatures based on an analytical function.